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September 13, 2011

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ENVIRONMENTAL RESPONSE ACTIVITIES
KENNEDY AVENUE SEWER REPLACEMENT
EAST CHICAGO, INDIANA

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ENVIRONMENTAL RESPONSE ACTIVITIES
KENNEDY AVENUE SEWER REPLACEMENT
EAST CHICAGO, INDIANA

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East Chicago - Project Manager	**Date**
Weaver Boos - Senior Project Manager	**Date**
USEPA Project Manager	**Date**

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DISTRIBUTION LIST

East Chicago Project Manager	Pete Baranyai
Weaver Boos Principal	Douglas G. Dorgan, Jr., LPG
Weaver Boos Senior Project Manager	Peter Cambouris, LPG
USEPA Project Manager	Mike Berkoff

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PROJECT/TASK ORGANIZATION

The various individuals and organizations participating in the project include the following:

United States Environmental Protection Agency

The subject Site is located within the boundaries of the U.S. Smelter and Lead Refinery, Inc. Superfund site (EPA ID# IND047030226). In order to proceed with planned sewer replacement work at the Site, the United States Environmental Protection Agency (USEPA) is requiring that fill material be characterized and managed properly at the Property to address possible lead impacts.

Mr. Pete Baranyai, City of East Chicago Utilities Director

The project area is located within a larger area that the USEPA has placed on the National Priorities List (NPL). The City Sanitary District must maintain utilities within this primarily residential area as part of its ongoing municipal responsibilities. Mr. Pete Baranyai will serve as the Project Manager for the City of East Chicago during this project. Mr. Baranyai is the Utilities Director and oversees all aspects of the East Chicago Sanitary District.

Weaver Boos Consultants

The City of East Chicago has retained the services of Weaver Boos Consultants to assist with the environmental issues that are anticipated to arise during site development activities. Weaver Boos will assist the City with the collection of waste characterization and profiling samples, coordinate the disposal paperwork and transportation of the excavated fill material, collect post-excavation verification samples, and document the activities in a report.

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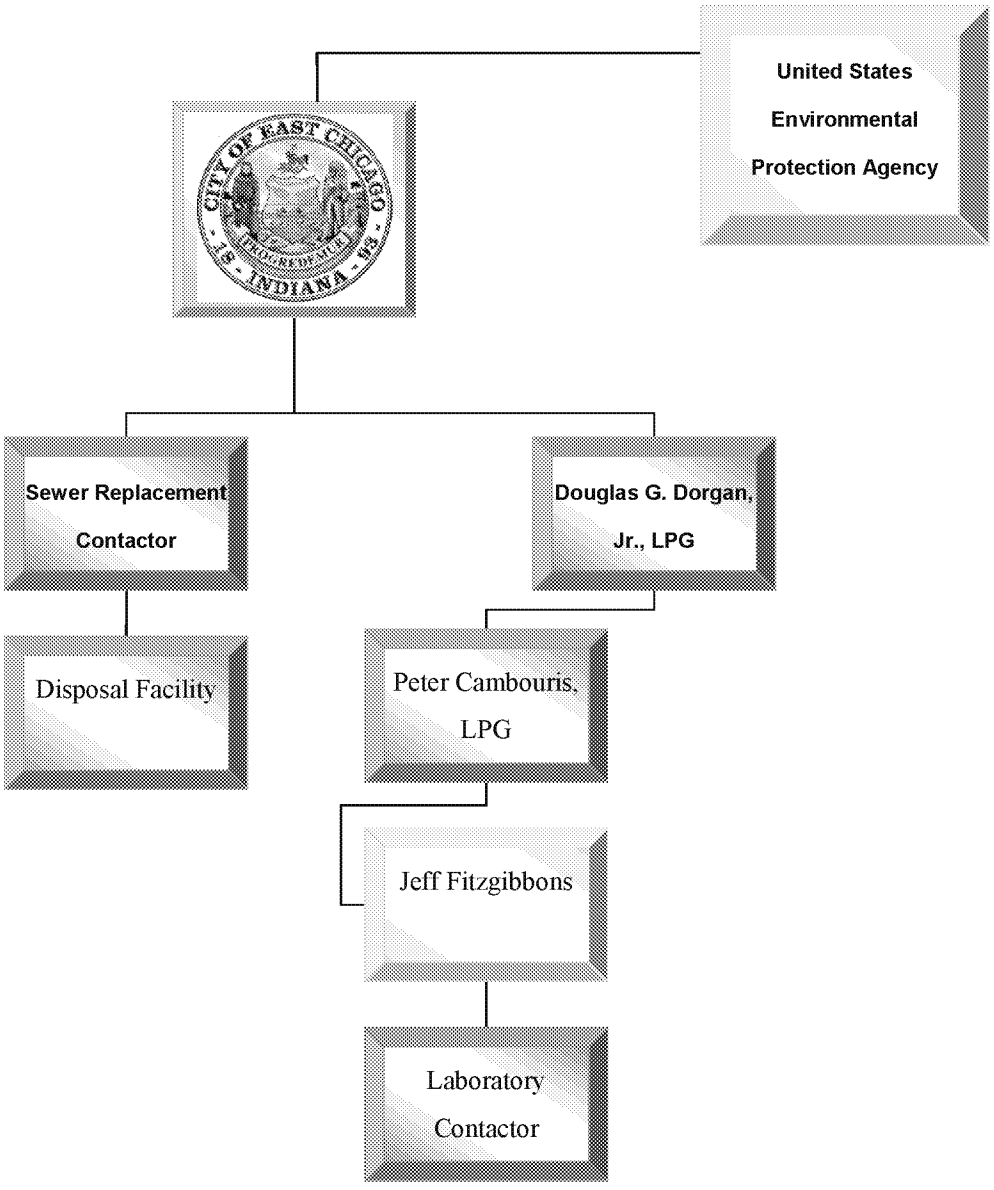
The following presents the organizational chart for this project:



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1.0 PROJECT MANAGEMENT

The following Quality Assurance Project Plan (QA Project Plan) presents the organization, objectives, planned activities, and specific Quality Assurance (QA) / Quality Control (QC) procedures associated with environmental activities occurring at the project area located in East Chicago, Indiana. Specific protocols for sampling, sample handling and storage, chain-of-custody, and laboratory and field analysis will be described in this document. QA/QC procedures will be structured in accordance with applicable United States Environmental Protection Agency (USEPA) requirements, regulations, guidance, and technical standards. This QA Project Plan has been prepared in accordance with the USEPA Region V policy as presented in *EPA Requirements for Quality Assurance Project Plans*, March, 2001. Various details concerning the laboratory analysis to be performed during this project are included in a Laboratory Quality Assurance Plan included as **Appendix A**.

1.1 Problem Definition/Background

The USEPA has placed the project area and the adjacent neighborhood on its National Priorities List (NPL). At this time, no remediation has been conducted at the project area. In order to proceed with the restoration of the sewer pipe, the City has to conduct the work with consideration to the appropriate environmental requirements associated with Superfund sites. Based on our understanding, the USEPA is requiring that fill material be characterized and managed properly at the Property to address possible lead impacts.

1.2 Project/Task Description

A description of the work to be performed, products to be produced, and the schedule for implementation are provided in the Work Plan for Environmental Response Activities. The location of the project area is shown on the attached **Figure 1**.

1.3 Quality Objectives and Criteria

The overall QA objective for this investigation is to develop and implement procedures for laboratory analysis, chain-of-custody, and reporting that will provide results which are legally defensible. Definitions and objectives for data precision, accuracy, completeness, representativeness, and comparability are provided in this section, along with a discussion of the

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overall level of QC effort. Specific data collection and management procedures are discussed in subsequent sections of this QA Project Plan.

1.3.1 Precision

Precision is a measure of the scatter of a group of measurements around their average value. Provided that the measurements are made under the same specified conditions, the precision value will demonstrate the reproducibility of the measurement process.

Laboratory precision will be assessed through the calculation of Relative Percent Differences (RPD) and Relative Standard Deviations (RSD) for three or more replicate samples. Replicates will measure the effect of laboratory procedures on data reproducibility.

Details concerning the methods for evaluating precision and the acceptance criteria are included in the Quality Assurance Plan in **Appendix A**.

1.3.2 Accuracy

Accuracy is a measure of the degree of agreement between a sample value and its accepted reference value.

Laboratory accuracy will be assessed through the use of method blanks, standard reference material samples, and matrix spike samples. These samples will be used to assess the effect of laboratory procedures on the true values of the sample results. In addition, matrix spike samples will be used to provide information regarding the effect of the sample matrix on the laboratory methods. The percent of recovery will be calculated for each sample.

Details concerning the methods for evaluating accuracy and the acceptance criteria are included in the Quality Assurance Plan in **Appendix A**.

1.3.3 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. "Normal conditions" are defined as the conditions expected if the sampling plan were implemented exactly as planned.

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Laboratory completeness will be assessed as the amount of valid measurements obtained from all the measurements made during the project. The laboratory completeness objective for this project will be greater than 95 percent.

1.3.4 Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. It is a qualitative parameter which is dependent on the field sampling program and proper laboratory protocol.

The representativeness of laboratory data depends on the proper implementation of the analysis program, meeting sample holding times, and analyzing and assessing field duplicate samples. The sampling network was designed to provide data representative of facility conditions. During development of this network, consideration was given to past waste disposal practices, existing analytical data, physical setting, and constraints inherent to the Superfund program.

1.3.5 Decision Rules

A Decision Rule is a statement which allows for a course of action or non-action to be taken, based on assumptions made to draw out and test its logical or empirical consequences.

The decision rule objectives for this project will address the following:

- Define statistical parameters characterizing the population (e.g. mean, maximum, and percentile) and incorporate the scale of decision-making (e.g. size of site).
- Identify action level(s).
- Develop "if/then" statements defining conditions that would cause the decision maker to choose among alternative actions (e.g. remediation or no remediation).

Characterization and confirmation data will be utilized for each individual property address. The applicable action level will be the USEPA industrial/commercial clean up level for lead in the soil of 800 mg/kg.

1.3.6 Level of Quality Control Effort

Laboratory QC samples and the frequency of analysis are listed below:

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- Method blank samples are generated within the laboratory and used to assess possible laboratory contamination of samples associated with all stages of preparation and analysis of sample extracts. Method blank results will not be used to modify the sample results by the laboratories reporting the data. For organic analyses, a minimum of 1 method blank will be analyzed for every extraction batch, or 1 for every 20 samples, whichever is more frequent. For metals and conventional analyses, 1 method blank will be analyzed for every digestion batch, or 1 for every 20 samples, whichever is more frequent.
- Matrix spike samples will be used to evaluate the effect of sample matrices on the quantification of contaminant concentrations and therefore the bias of the method for the analytes of interest and the matrix. A matrix spike is a sample, prepared in duplicate, to which a known concentration of pure analyte is added prior to digestion or extraction and analysis. For metals and conventional analysis, matrix spike samples will be analyzed at a frequency of 1 for every 20 samples received or once per sample delivery group received, whichever is greater.
- Trip blanks (i.e. "shipping blanks") are used to assess the potential for contamination of aqueous samples due to contaminant migration during sample shipment and storage. Trip blanks will not be required for this project since only soil samples will be obtained, but are included in this section for completeness. Trip blanks would be prepared in the laboratory by filling sets of 40 mL VOA vials with laboratory distilled/deionized water, sealing the vials with septum-lined caps (allowing no headspace), and shipping at least one set of two vials from the laboratory with each sample shipment. The vials remain in the shipping container from the time they leave the laboratory until the time they return to the laboratory along with field samples.

1.4 Special Training/Certification

Given the nature of the fill material anticipated to be excavated during the project, the following staff will be required to have attained the 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training in accordance with 29 CFR 1910.120:

- Weaver Boos staff onsite during remediation activities; and
- The contractor responsible for excavation and loading for transport to the proper disposal facility.

Additional health and safety requirements are included in the Health and Safety Plan (HASP) developed specifically for this project.

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The contractor hired to transport the excavated soils from the project area to the disposal facility also must have all of the applicable federal, state, and local licenses and certifications in place before hauling soils for this project.

1.5 Documents and Records

At the direction of the USEPA Project Manager, The City of East Chicago (The City) will have overall responsibility for all phases of this project. The City, in conjunction with its technical consultant, Weaver Boos Consultants North Central, LLC will perform the site characterization, coordinate the disposal of excavated soils, prepare the appropriate report, and perform subsequent corrective measures, as necessary. The City and Weaver Boos Consultants North Central, LLC also will provide project management. The various field, laboratory, QA, and management responsibilities of key project personnel are defined in this section.

1.5.1 Management Responsibilities

1.5.1.1 USEPA Project Manager

The USEPA Project Manager has overall responsibility for all phases of the project. Routine contact and communications will be channeled through the USEPA Project Manager. Additionally, all major modifications or revisions to the project requiring USEPA approval will be directed to the USEPA Project Manager. Mr. Mike Berkoff or his successor, will serve as the USEPA Manager for the investigations conducted under this QA Project Plan.

1.5.1.2 City of East Chicago Project Manager

The responsibility for project completion will rest with the City of East Chicago Project Manager. This person will report to the USEPA Project Manager and he will provide the major point of contact and control for matters concerning the project. This person will have overall responsibility for ensuring that the project meets USEPA objectives. In addition, this person will be responsible for technical QC and project oversight, and will provide access to municipal resources. This person will have the authority to commit the resources necessary to ensure that technical, financial and scheduling objectives are achieved successfully.

The City of East Chicago Project Manager will be Mr. Pete Baranyai or his successor.

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1.5.1.3 Weaver Boos Principal-in-Charge

The Principal-in-Charge (PIC) will have overall responsibility for ensuring the client's satisfaction and proper completion of the agreed-upon scope of work. In that capacity, he will ensure the Weaver Boos Senior Project Manager receives all necessary technical support. The PIC is also the client's advocate and will assist in resolving any technical, contractual, financial, or scheduling problems that cannot be resolved through the normal client/project manager relationship. The Weaver Boos PIC will also be responsible for performing internal field audits and ensuring that Weaver Boos procedures for this project are being followed.

The Weaver Boos PIC will be Mr. Douglas G. Dorgan, or his successor.

1.5.1.4 Weaver Boos Senior Project Manager

The Weaver Boos Senior Project Manager will be responsible for assigning and supervising discrete tasks identified in this QA Project Plan. He will report directly to the City of East Chicago Project Manager. He will provide assistance to the City of East Chicago Project Manager in terms of writing and distributing the QA Project Plan to all parties associated with the project, including the analytical laboratory. He will have responsibility for technical QC and project oversight.

The Weaver Boos Senior Project Manager will be Mr. Peter Cambouris, or his successor.

1.5.2 Content of Report(s)

The report produced at the end of this project will include the following major items:

- Introduction;
- Narrative description of the field investigation (waste characterization sampling and confirmation sampling);
- Laboratory analytical results;
- Applicable QA/QC data;
- Summary of comparisons to applicable environmental standards;
- Daily field summaries;
- Photographs;
- Disposal manifests and load tickets;

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- Summary of any deviations from the QA Project Plan (if any); and
- Summary of results/findings.

Two hard copies of the report will be provided to the USEPA, along with one electronic copy of the report in .pdf format. The remaining recipients of the report will receive an electronic copy in .pdf format.

The level of QA/QC reporting required for the laboratory reports will be "Level IV Std", as described in Section 25.3 of the Laboratory Quality Assurance Plan in **Appendix A**.

The final evidence file will be the central repository for all documents which constitute evidence relevant to sampling and analysis activities as described in this QA Project Plan. It will be kept in the possession of the City of East Chicago Project Manager. The contents of the evidence file will include relevant records, reports, logs, field notebooks, pictures, subcontractor reports, and data reviews. The evidence file will be stored in a secure, limited-access area and will include at a minimum:

- Field logbooks;
- Field data and data deliverables;
- Photographs;
- Drawings;
- Laboratory data deliverables;
- Data assessment reports;
- Shipping documentation (manifests, load tickets, etc.);
- Disposal documentation;
- Progress reports, QA reports, interim project reports, etc.
- Custody documentation (tags, forms, air bills, etc).

The final evidence files will be kept for a minimum of 3 years. Prior to disposal, the evidence file will be offered to the USEPA Project Manager.

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2. DATA GENERATION AND ACQUISTION

This section of the QA Project Plan addresses all aspects of data generation and acquisition to ensure that appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and QC activities are employed and documented.

2.1 Sampling Process Design (Experimental Design)

The environmental samples anticipated to be collected during the project are described within the Work Plan for Environmental Response Activities.

2.2 Sampling Methods

2.2.1 Soil Sampling Methods

The pre-excavation samples will be collected using either stainless steel hand soil probe equipment or a GeoProbe. The hand soil probe equipment contains a hollow core barrel that is approximately 0.5 to 1.0 inches in diameter with extension rods to allow for probing to additional depths. The hand soil probe will be advanced to a depth of 1 to 3 feet below ground surface and the soil obtained from the probe will be transferred to a stainless steel mixing bowl for compositing.

If a hand soil probe is unable to efficiently attain the required depth, then a GeoProbe and a Macro-Core (MC) sampler will be utilized. The MC sampler has an outside diameter of 2.0 inches and comes in four lengths, 4-, 3-, or 2-foot or 1 meter. When using the 48-inch sample tube, the sampler is capable of recovering a core measuring up to 1300mL in volume in the form of a 45-inch x 1.5-inch core. The samples are recovered in a liner inserted inside the MC sample tube. Liners are 46-, 34-, or 22-inches long to fit the three sizes of sample tubes, and are 1.75 inches in diameter. Liners are available in stainless steel, Teflon, PVC, and PETG. MC spacer rings are used to attach liners to the cutting shoe. Core catchers also are available to improve sample recovery in some formations. A core catcher can be used to prevent saturated sands and other non-cohesive soils from falling out of the MC sampler as it is retrieved from depth.

The post-excavation fill material samples will be collected with a decontaminated stainless steel hand trowel and placed directly into clean containers supplied by the laboratory. The post-excavation samples will not be composited.

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Additional details concerning the number of pre-excavation fill material samples to be collected are presented in Section 2 and 3 of the Work Plan.

2.2.2 Decontamination Methods

The following presents a series of step by step procedures for decontamination of field equipment:

1. Typically, smaller, more manageable equipment will be decontaminated in a plastic or galvanized tub. The brush and container used for the decontamination process should be treated in the same manner as sampling equipment in steps 2 through 8.

2. Decontamination is to be performed before sampling events and between sampling points.

3. Remove all solid particles from the equipment or material by brushing and then rinsing with available tap water or deionized water. This initial step is performed to remove obvious contamination. Depending on the size of the equipment being contaminated, this may be preceded by a steam of high pressure water rinse to remove solids and/or residual oil or grease.

4. Wash the equipment or sampler with a phosphate-free detergent solution (i.e. Alconox, Liquinox, etc.).

5. Rinse with tap water or distilled/deionized water until all detergent and other residue is washed away. Re-rinse if necessary or repeat previous steps as necessary.

6. Dispose of soiled materials and wash solutions in the designated disposal containers, which will be disposed at that appropriate disposal facility depending on site data.

The sample container for the analysis of the pre-excavation fill material characterization samples and post-excavation confirmation samples will be new 4-ounce glass jars with Teflon lids. No chemical preservative will be required to be added to the soil samples, however, they should be stored on ice to a temperature near 4 degrees Celsius after collection. The holding time to sample extraction for these soil samples will be 6 months from the date of collection.

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2.3 Sample Handling and Custody

Documentation of evidence custody is one of several factors necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity.

An item of evidence is in an individual's custody if:

1. The item is in actual physical possession of the individual;
2. The item is in view of the individual after being in actual physical possession of the individual;
3. The item was in actual physical possession but is locked up to prevent tampering; or
4. The item is in a designated and identified secure area.

2.3.1 Field Custody Procedures

Field logbooks will provide the means of recording data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the facility could reconstruct a particular situation without reliance on memory.

Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in the document control center when not in use. Each logbook will be identified by the project-specific document number.

The title page of each logbook will contain the following:

- Person to whom the logbook is assigned.
- Logbook number.
- Project name.
- Project start date, and
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the site, field sampling or investigation team personnel and the purpose of their visit will also be recorded in the field logbook.

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Measurements made and samples collected will be recorded. All entries will be made in ink, signed, and dated and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark which is signed and dated by the sampler. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station will be recorded. All equipment used to make measurements will be identified, along with the date of calibration. All blank portions of partially used logbook pages will be marked through with a single diagonal line, initialed and dated.

The sample packaging and shipment procedures are presented below.

a) The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples.

b) All bottles will be identified by use of sample tags or labels with sample numbers, sampling locations, date/time of collection, and type of analysis.

c) Sample tags or labels are to be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag or label because the ball-point pen would not function in freezing weather.

d) Samples are accompanied by a properly completed chain of custody form. The sample numbers and locations will be listed on the chain of custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage area.

e) Samples will be properly packaged on ice at 4°C for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in and secured to the inside top of each sample box or cooler. Shipping containers will be locked and secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals are covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.

f) Whenever samples are collected with a government agency, a separate sample receipt is prepared for those samples and marked to indicate with whom the samples are being collocated. The person relinquishing the samples to the agency should request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses to sign, this is noted in the "Received By" space.

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g) Shipments will be accompanied by the Chain of Custody Record identifying the contents. The original record will accompany the shipment, and the pink and yellow copies will be retained by the sampler for return to the sampling office.

h) If the samples are sent by common carrier, a bill of lading should be used. Receipts of bills of lading will be retained as part of the permanent documentation. If sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

i) Samples will be transported by overnight carrier to the laboratory the same day the samples are collected in the field or picked up by the laboratory on-site or delivered personally to the laboratory by a member of the sampling team within one working day of sample collection.

2.4 Analytical Methods

Chemical analysis of soil samples will be performed by a third party laboratory that is certified under the National Environmental Laboratory Accreditation Certification (NELAC).

The laboratory analytical procedures will be in accordance with approved techniques and methods as outlined in USEPA SW-846, Test Methods for Evaluating Solid Waste, Third Edition. Specifically, the following laboratory analytical methods are anticipated to be applicable:

- Total RCRA metals by SW-846 Method 6010/6020/7470A/7471A;
- Toxicity Characteristic Leaching Procedure (TCLP) by SW-846 Method 1311;
- Volatile organic compounds (VOCs) using Method 5035/8260B; and
- Polynuclear Aromatic Hydrocarbons (PNAs) using USEPA Method 8270C.

The reporting limits employed will need to be at or below the applicable regulatory levels and/or equal to the standard estimated quantitation limits (EQLs) specified in the analytical methods.

2.5 Quality Control

The analytical laboratory will perform QC checks to assure the reliability and validity of their analyses. The Internal Quality Control checks will be based upon the standard SW-846 methods to be utilized and might differ slightly for each individual procedure. However, in general, the QC requirements include the following:

- Field/Trip blanks

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- Method blanks
- Reagent/preparation blanks (applicable to inorganic analysis)
- Instrument blanks
- Matrix spikes/matrix spike duplicates
- Surrogate spikes
- Field duplicates
- Laboratory duplicates
- Laboratory control standards
- Internal standard areas for GC/MS analysis; control limits
- Mass tuning for GC/MS analysis.

The laboratory will provide a full deliverable data package which will allow the recipient to reconstruct QC information and compare it to QC criteria. Any samples determined not to conform with the QC criteria will be reanalyzed by the laboratory, if sufficient sample volume is available. It is planned that sufficient volumes/weights of samples will be collected to allow for reanalysis when necessary.

2.6 Instrument/Equipment Testing, Inspection, and Maintenance

Preventative maintenance of laboratory equipment includes routine procedures to be carried out with each use, routine procedures to be carried out at scheduled intervals, and procedures to be carried out on an as needed basis. Each instrument will have a bound logbook in which all scheduled and unscheduled maintenance is recorded in detail.

Before being placed into service, new equipment will be calibrated and verified to ensure that it meets required specifications. QA authorization will be required before new equipment is used in production.

Routine maintenance will be performed according to the manufacturer's recommended procedures. The frequency of this maintenance is based upon the manufacturer's guidance and the experience of the trained analytical staff. Only trained staff and certified third party contractors will perform equipment and instrument maintenance. Instrument specific log books will be used to document the maintenance (both scheduled and non-scheduled) performed on

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each piece of equipment. Copies of manufacturer maintenance reports are also retained in these logbooks. At a minimum, maintenance logs will include the following information:

- Instrument ID;
- Specific required maintenance items;
- Operator's manual, if available; and
- Service records of calibration/verification/maintenance.

Major instruments as well as support equipment that are generating output that does not meet the required acceptance criteria must be labeled as "out of service". If appropriate, the power supply to the equipment should be interrupted. When an instrument problem occurs, the effect on data previously generated is evaluated, where applicable. Whenever equipment goes outside the direct control of the laboratory for repair, maintenance, or for some other purpose, the laboratory ensures that he function and calibration status of the equipment are checked and shown to be satisfactory before the equipment is returned to services. Equipment undergoing verification services suitability shall be labeled "In Development" to ensure that it is not inadvertently used in production prior to QA approval.

2.7 Instrument/Equipment Calibration and Frequency

Laboratory instrument calibration procedures and frequencies are presented in Section 20.1.1 of the Laboratory Quality Assurance Plan, which is provided as **Appendix A**.

Calibration procedures for each instrument will be documented in a logbook. The documentation will include the instrument identification, including serial number, the date and time of calibration, the name of the person performing the calibration, the calibration solutions used, the calibration values, and the samples associated with these calibrations.

2.8 Inspection/Acceptance of Supplies and Consumables

The procurement of equipment and supplies will be controlled to ensure that the equipment and supplies used by the laboratory are of known quality and conform to the specified requirements. Control includes vendor selection, evaluation of the quality records provided by the supplier by methods such as solvent checks, and examination of items received upon delivery or completion. Purchased equipment is not used to analyze environmental samples until the capability and detection limit requirements identified in this Plan are performed and documented. Vendor

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records will be tracked by the laboratory. Procurement planning, supplier selection, and verification of procurement requirements are the responsibility of and approved by the Managing Director of the laboratory.

2.9 Non-direct Measurements

No data is anticipated to be obtained from non-measurement sources during this project. Therefore, this section is not applicable.

2.10 Data Management

Data reduction is the process of converting raw analytical data to final results in proper reporting units. In most cases, data reduction primarily will concern the equation used to calibrate results. Data reduction procedures for laboratory activities are discussed below.

Laboratory data reduction procedures will be performed according to the following protocol. All raw analytical data will be recorded in numerically identified laboratory notebooks. These notebooks will be issued only by the Laboratory QA/QC Manager. Data are recorded in this notebook along with other pertinent information, such as the sample identification number and the sample tag number. Other details will also be recorded in the lab notebook, such as the analytical method used (SOP#), name of analyst, the date of analysis, matrix sampled, reagent concentrations, instrument settings, and the raw data. Each page of the notebook shall be signed and dated by the analyst. Copies of any strip chart printouts (such as gas chromatograms) will be maintained on file. Periodic review of these notebooks by the Lab QA Manager will take place prior to final data reporting. Records of notebook entry inspections will be maintained by the Lab QA Manager.

For this project, the equations that will be employed in reducing data are presented in the Laboratory Quality Assurance Plan presented in **Appendix A**. The formulae included in the Laboratory Quality Assurance Plan make pertinent allowances for matrix type. All calculations are checked by the Laboratory QA Manager at the conclusion of each operating day. Errors are noted, corrections are made, but the original notations are crossed out legibly. Analytical results for soil samples shall be calculated and reported on a dry weight basis.

QC data (e.g. laboratory duplicates, surrogates, MS/MSDs) will be compared to the method acceptance criteria. Data considered to be acceptable will be entered into the laboratory

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computer system. Data summaries will be sent to the Laboratory QA Manager for review. If approved, data are logged into the project database format. Unacceptable data shall be appropriately qualified in the project report. Case narratives will be prepared which will include information concerning data that fell outside acceptable limits, and any other anomalous conditions encountered during sample analysis.

Data reporting is the detailed description of data deliverables used to completely document the calibration, analysis, QC measures, and calculations. Data reporting procedures for laboratory activities are discussed in Section 25.3 of the Laboratory Quality Assurance Plan in **Appendix A**.

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3. ASSESSMENT AND OVERSIGHT

3.1 Assessments and Response Actions

This section discusses the performance and system audits that will be conducted to verify that sampling and analyses are performed in accordance with the procedures established in this QA Project Plan. The performance audit will be an independent check to evaluate the quality of the data being generated. The system audit will be an on-site review and evaluation of the facilities, instrumentation, QA/QC practices, and data management practices. The audits will be conducted for field and laboratory activities, and they will include two independent parts: internal audits and external audits.

3.1.1 Laboratory Performance and System Audits

Laboratory audits will verify that QA/QC programs are strictly followed by the appropriate personnel during laboratory activities.

3.1.1.1 Internal Laboratory Audits

Internal audits of laboratory activities will be conducted by the laboratory.

The internal lab system audits will be done on an annual basis, while the internal lab performance audit will be conducted on a semi-annual basis.

The internal lab system audits will include an examination of laboratory documentation on sample receiving, sample log-in, sample storage, chain-of-custody procedures, sample preparation and analysis, instrument operating records, etc. The performance audits will involve preparing blind QC samples and submitting them along with project samples to the laboratory for analysis throughout the project. The laboratory QA Manager will evaluate the analytical results of these blind performance samples to ensure the laboratory maintains acceptable QC performance.

Internal laboratory system audits will include examination of the following laboratory procedures:

- sample receipt, log-in, and chain-of-custody documentation;
- sample storage and preparation;

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- data custody and data management;
- compliance with QA/QC objectives;
- adherence to laboratory SOPs;
- cleanliness and housekeeping;
- sample analysis; and
- Instrument operating records.

Internal laboratory performance audits will include examination of blind performance evaluation samples containing the project analytes of concern. These blind performance samples will have a known concentration of analytes of concern. The analytical results of these blind performance tests will be evaluated to determine whether the laboratory has maintained acceptable QC performance. Similar follow-up audits will be conducted to correct deficiencies, and to verify that QA procedures are maintained for the duration of the investigation.

3.1.1.2 External Laboratory Audits

External audits of the laboratory may be conducted by the USEPA Region V Contract and Analytical Support Section (CASS). The results will be reported to the USEPA Region V RCRA Project Manager.

External laboratory audits will not be conducted more than once annually. These audits may or may not be announced and will be conducted at the discretion of the USEPA.

External laboratory audit procedures will include, but not be limited to, the following:

a) Review of laboratory analytical procedures; and
b) Submission of performance evaluation samples to the laboratory for analysis.

3.2 Reports to Management

The deliverables associated with the tasks identified in the Work Plan will contain separate QA sections in which data quality information collected during the tasks is summarized. Those reports will be the responsibility of the East Chicago Project Manager and will include information on the accuracy, precision, and completeness of the data, as well as the results of the performance and system audits, and any corrective action needed or taken during the project.

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3.2.1 Contents of Project Quality Assurance Reports

Project quality assurance reports will contain results regarding attainment of data quality objectives, and any corrective actions taken with an assessment of their project impact. Detailed references to QA Project Plan modifications will also be included. The QA reports will be prepared in written, final format by the East Chicago Project Manager or his designee. To the extent possible, assessment of the project should also be performed on the basis of available QC data and overall results in relation to originally targeted objectives.

To be included in the project QA reports will be information on the laboratory quality assurance reports to management. The laboratory QA reports will discuss the following:

- Evaluation of precision, accuracy, and completeness
- Discussion of each matrix
- Discussion of each parameter by matrix
- Results of the performance audits
- Results of the system audits
- Significant QA/QC problems and recommended solutions
- Resolutions of previously stated problems

3.2.2 Frequency of QA Reports

Quality assurance reports will be completed by the City of East Chicago Project Manager (or his designee) on an annual basis. QA reports will be given to the laboratory and Weaver Boos Project Managers on an annual basis.

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4. DATA VALIDATION AND USEABILITY

4.1 Data Review, Verification, and Validation

Data validation is the process of qualifying measurement and/or analytical data on the performance of the laboratory QC measures incorporated into the sampling and analysis procedures. Data validation will only occur during the collection of post-excavation confirmation samples.

Ten percent of the laboratory data collected during the post-excavation confirmation sampling will be validated. Laboratory data validation procedures will be conducted by an independent third party, who will generate a data validation report.

The data validation procedures are summarized below and derived from the USEPA's *Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review* (dated October 2004, or more recent version, if available). The following data validation procedures will be followed:

- Reviewing chain-of-custody documentation;
- Evaluating holding times;
- Reviewing laboratory data packages for calibration information, laboratory blanks, laboratory duplicates, laboratory matrix spikes, and matrix spike duplicates, laboratory control samples, surrogate compounds, internal standards, and instrument-specific QC procedures;
- Assessing laboratory calculations to evaluate whether results have been accurately reported;
- Assessing the impact of laboratory QC results;
- Reviewing the field QC results; and
- Assigning data qualifiers.

The party performing the data validation services will generate a data validation report that will be included in the Remedial Action Completion Report.

FIGURES

APPENDIX A

LABORATORY QUALITY ASSURANCE PLAN